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Conceptual Problems in Main Group Chemistry

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During our past work numerous issues concerning bonding situations in main group compounds were encountered that will be highlighted in this talk. Problems to be addressed include:

- (i) The steric activity of free valence electron pairs.
- (ii) The role of semi-ionic, multi-center bonding in complex fluorides, oxofluorides, and compounds containing sterically active free valence electron pairs.
- (iii) How the replacement of fluorine ligands in pentagonal bipyramidal heptafluorides by either doubly bonded oxygen ligands or free valence electron pairs influences the overall bonding.
- (iv) The difficulty of describing in the N_5^+ cation the bonding and charge distribution derived from the experimental data, with resonance structures that satisfy the octet rule.